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ABSTRACT

This qualitative study proposes a model of the processes of attaining professional knowledge through which teachers develop strategies for becoming comfortable with their image of themselves as effective teachers. Case studies of 12 experienced elementary school teachers in Brisbane, Australia, examined how they gain their professional knowledge and sustain their professional growth. Data from the case studies indicate that teachers built a sense of their own competence by developing a concept of professional practice which was both knowledgeable and malleable, that is, firmly rooted in theory and experience while remaining adaptable to a situation which is conceived as having similarities to and differences from what is known. A transformational model of continuous professional learning is presented, with the following four elements: individual perception of professional challenges and triggers for change, gaining an understanding of the nature of the professional challenge, sources available for resolving the challenge and for extending professional learning, and strategies adopted for resolving uncertainty which in many cases leads to professional growth. The model's implications for the structure of teacher education programs at both the inservice and preservice levels are discussed. (Contains 36 references.) (JDD)

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TITLE: Professional Uncertainty and Professional Growth

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Professional Uncertainty and Professional Growth: A Case Study of Experienced Teachers

ABSTRACT

This qualitative study proposes a model of the processes of attaining professional knowledge through which teachers develop strategies for getting comfortable with their image of themselves as an effective teacher. This is in itself a changing concept of effectiveness which has to be able to encompass dealing with professional uncertainty as a legitimate function of their role and not as a reflection of their inadequacies.

The 12 Experienced teachers in this case study preserved and built a sense of their own competence by developing a concept of professional practice which was both knowledgeable and malleable. The strategies they used to resolve professional uncertainty are described.

In this case study, the NUD.IST computer software program was used to support the data analysis and interpretation.

1.0 INTRODUCTION

This research study focused on teachers' professional knowledge and, in particular, on teachers' perceptions of how they gain their professional knowledge. In sustaining their professional growth, teachers draw on complex information which they recall and process according to their perceptions of the educational context in which this knowledge is to be used (Lampert & Clark, 1990). This case study sought to gain an insight into the origins and experiences which appear significant in shaping this complex knowledge for a group of experienced teachers.

The assumption is generally made that particular experiences are used by teachers at all stages of their development, as vehicles for remembering significant educational knowledge and responding to teaching and learning incidents. It is important to understand what makes particular experiences salient and memorable for particular teachers at different stages of development (Feiman-Nemser & Floden, 1986) and the role this plays in the processes of professional learning.

2.0 AIMS and SIGNIFICANCE of the STUDY

The research aimed to:

(i) identify and describe experienced teachers' perceptions of significant experiences in their professional development ;

(ii) explore the characteristics of experiences in professional development which teachers considered salient and memorable;

(iii) identify and describe that which experienced teachers use to focus and resolve professional uncertainty;

(iv) develop a model of progression in professional development which could inform the teacher education curriculum.

The study is significant in two ways: Firstly in relation to its focus on case knowledge in professional development, and secondly as part of a collaborative research response to changes in education in Queensland, Australia.

Firstly, research directed at identifying teachers' beliefs and mental processes is a key to understanding how teachers move from novice to expert, (Richardson, 1990). This study is

based on the belief that the ways in which teachers acquire and use knowledge are contextual, interactive and speculative (Lampert & Clark, 1990). Models of professional development such as those constructed by Evans (1990), and Elliott and Lange (1991), suggest that teachers recall complex sets of knowledge which are stored in episodic memory and processed under executive control at some later stage, dependent upon the context and saliency of the particular experience or case, (Burroughs-Lange and Lange, 1992).

Writers such as Shulman (1986) see considerable potential for the improvement of teacher education and professional development through the building of case literature for the profession. Paradigm shifts in research in education suggest that these forms of representation of teacher knowledge be seen as a new kind of data about which to reason. This is compatible with the trend to establish teachers themselves in a much more focal and powerful position in the research process. Greater attention is being given to the importance of the voice of teachers in understanding professional learning and teachers' stories are used as a major source of research data in our study.

McAnich (1991) argues that research should enable the development of teacher education programs which encourage participants to better develop theoretical positions about teaching. She points to the relatively slow progress in the area because of a lack of information on which types of cases should be developed as part of teacher professional development programs. The identification of the elements which make cases memorable and the ways in which these elements change when used by novices or experts should enable answers to these questions to be found.

Secondly, the study is a part of The Board of Teacher Registration in Queensland facilitation of a network of researchers who are concerned with studying the knowledge base of teachers. The overall significance of our study will be enhanced by juxtaposition and synthesis with the research of our colleagues in developing a descriptive account and theoretical explanation of teacher knowledge as a continuum of professional growth (publication pending).

3.0 BACKGROUND to the STUDY

The significance of the research reported here can be understood in relation to two identifiable directions within the research literature in this field. Namely, change-oriented studies focussing on teacher behaviour and practices, and 'learning to teach' research directed more at teachers' inner selves and cognitions as driving their actions. It is argued here that the latter focus provides the most fertile context for a study of teachers' professional development.

Recent policy in teacher education has begun to recognise the crucial role of thought and reflection, of cognition and meta-cognition in professional development (Shavelson and Stern, 1981; Clark and Peterson, 1986). Literature which focuses on the processes of learning to teach, explains teaching in terms of both contextual factors and personal teacher factors - beliefs, knowledge, attitudes and perceptions. For example, Richardson (1990) points out that the current learning-to-teach research , as well as an increasing number of teacher development programs, have their focus on individual teacher cognition, beliefs and mental processes rather than on teaching behaviour 'per se'. So the learning-to-teach literature focuses on the individual teacher and professes that teachers change on the basis of who they are and what experiences they have had. This major shift from an earlier focus on change in teacher behaviours to changes in teacher practical and professional knowledge and cognitions seems very promising. This literature further suggests that classroom actions as a direct product of teacher behaviour may be considered of less importance as a focus of teacher change than the identification of teacher knowledge that drives or is a part of these classroom actions. It is this knowledge that allows the teacher to quickly judge a situation or context and take action on the basis of knowledge that has been gained or created from similar situations in the past. Fenstermacher (1986) proposes that this previously structured knowledge forms a set of empirical, value, and situational premises that may be examined as justification for particular responses and classroom actions.

Building on the work of Schon (1987) and Shulman (1986), it is increasingly recognised that the acquisition and use of the knowledge base involve interactive processes in which action and reflection support the teacher in developing understanding of the teaching/learning process (Bullough & Knowles, 1992; Dewey, 1933). There is, as Bodner

(1986) argues, a need to recognise a constructivist view of how teachers attain their knowledge of teaching, rather than to follow the traditional view that has characterised many teacher education programs, namely, that knowledge exists out there, to be learned and then applied when needed in particular contexts. Bodner proposes that "each of us builds our own view of reality by trying to find order in the chaos of signals that impinge on our senses", (p. 874). This perspective is also supported by Brown, Collins and Duguid (1989) when they argue that teachers gain their professional knowledge in authentic activity, which enables knowledge to be acquired in contexts that have meaning and purpose. Similarly, Palinscar and Brown (1989) use the idea of self-regulated learning. This notion suggests that teachers have some control over the processes of knowledge acquisition they use through their reflection on what they know about their own characteristics and the parameters of the problem; their use of meta-cognitive strategies to select, employ, monitor and evaluate their cognitive functioning; and their motivation to direct their knowledge to similar situations of professional uncertainty.

A number of writers have explored the question of how teachers acquire their knowledge by looking at influences on their professional development. Handal and Lauvas (1987;9) suggest that each teacher constructs a practical theory of teaching which is defined as " a person's (teacher's) private, integrated but ever changing system of knowledge, experience and values which is relevant to teaching practice at any particular time". They propose that what teachers do in their classrooms is underpinned by a framework of reasons for acting which are theory-based or practice-based, together with ethical and moral considerations as a basis for their decisions in relation to teaching and learning.

Glasser (1989), reviewed the advances in the analysis of teacher competence, knowledge, and skill acquisition as they inform processes, conditions and activities of professional learning. He concluded that:

> ". . we have identified properties of the state of attainment, but know less about the transformation operations that turn novice learners into increasingly competent individuals. How knowledge becomes organised and how processes that accompany and develop with learning and experience are current fundamental questions. " (p. 271)

It is clear that the process by which teachers develop their professional knowledge is not well understood, but is complex, developmental, idiosyncratic, and subject to a variety of

influences (Feiman-Nemser & Floden, 1986). By addressing in a case study setting these fundamental questions identified by Glasser, this research project further clarifies the contexts, conditions and experiences that enhance the growth of professional knowledge and learning in teachers.

4.0 METHODOLOGY

Two assumptions were accepted within this research approach. The first is that conceptions of reality are not considered as residing only within an individual's particular circumstances. Actors have a tendency to use particular conceptions in a number of settings or in a number of different ways. The fact that individuals change their thinking in various contexts might be seen as a threat to genuine understanding of human thinking and so it could be questioned whether generalisable knowledge about cognition is possible. This is countered by the second assumption of this design which sees conceptions of reality as relational phenomena, rather than as inherent qualities in the mind of the thinker, or in the phenomena themselves. Conceptions are abstractions from reality and these can represent various provinces of meaning. This qualitative case study design respects contextual specificity and allows the complexity of the teachers' constructed meanings to be sensitively represented (Peshkin, 1993).

The Sample

Twelve (12) elementary school teachers in Brisbane, Australia were selected as participants for this study. The teachers in the study represented both sexes and a range of years of experience , age groups taught and school contexts. The participants had been identified by their principals and peers as experienced and effective teachers through the Queensland Education Department's lengthy process of awarding "Advanced Skills Teacher" (AST) status. As part of Queensland's commitment to enhancing the quality of education, these teachers had been appraised according to criteria (derived from literature, research and similar initiatives) which focussed on demonstrating advanced skills in teaching; preparation and organisational skills; and the personal completion, and experience of leading professional development activities. These teachers are expected to play a significant role in the development

and supervision of colleagues and beginning teachers and hence could be expected to be able and interested in focusing on the processes of their own professional development.

Data Collection

Open-ended interviews of about one hour's duration were conducted at the school sites. The teachers were asked to focus on memorable experiences in their professional lives. This 'focus' and subsequent probing were the only structural elements in the conduct of the interviews. No protocol of questions was employed by the experienced interviewer. The particular experiences teachers identified were co-reflected upon by the researcher and teacher during the interview. The reasons why the experience or incident was perceived as significant and the ways it had influenced the teacher's thinking and practice were explored. All the interviews were audio-taped and transcribed. Observational and field notes relating to the school and interview context were also completed. Interview transcripts were returned to the teachers for checking and comment and in two cases a dialogue ensued around the themes discussed. These notes, dialogues and transcripts formed the raw data for analysis.

Data Analysis

The textual data were analysed through the processes of open, axial and selective coding, (Strauss & Corbin, 1990). The two procedures of constant comparison (between textual units assigned the same or similar categories) and negative case analysis (searching for examples of textual units that challenged emerging groupings) were employed (Glaser & Strauss, 1967). These procedures helped give the concepts in our grounded theory their precision and specificity. Theoretical explanations were developed from " . . . categories that are dense with concepts and saturated to the point that a range of variation can be accounted for, verified by hypothesis testing, and integrated, that is, woven together", (Corbin, 1986; 101). The analytic stages of the qualitative study were built on a dialectic between intense detail and the unifying view which enabled ways of seeing relationships to emerge, (Habermas, 1971). The grounded model which was educed from the data was member checked by reference to the teacher participants.

The NUD.IST software package was used to manage data analysis and theorise about its interpretation. The case for using the computer's ability to handle large quantities of textual

material has already been convincingly made, (Tesch, 1990). Using the computer to reduce tedious tasks presents researchers with the dilemma of keeping in check the urge to assemble neat and tidy coded segments and allow Agar's (1991) dialectic process to explore uncertainties and unresolved ambiguities. Without the use of a computer, the work of recording and carrying out initial and further identification of assertions and concepts (categories, labels, indices) is mechanically tedious and time consuming. It also delays the critical theorising processes which need to begin early and continue throughout the life of the research.

Employing the NUD.IST program in this study ensured that the mechanics of the field research did not draw attention away from the analytic processes; that new data were easily integrated and re-coding accommodated with great flexibility, (Burroughs-Lange & Lange, 1993; 1994). The software adopts a tree structure for representing relationships between codes (called indexes) and larger categories. A range of 14 operations, including boolean, non-boolean, and matrices, are available to research the data and test out potential relationships between codes and groups of codes. At any point in analysis, text can be produced which relates to the outcome of these sophisticated cross-referencing procedures, hence instantly grounding the analytic outcome in the data. An audit trail is automatically maintained by the software to log all the researcher's interactions with the index system and the progress of its development into a final conceptual or descriptive model. Memoing relating to contextual detail or theorising possibilities can be entered at any time into the data documents or at code points on the index tree. The processes of identifying themes, gaining fresh insights through immersion in the data, de-constructing and re-constructing meaning all involve hands-on, empathy and cognitive activity from the researcher. However, the mechanics of grouping, searching and re-organising labelled text units as insights grows, are all accomplished more easily and effectively with the use of NUD.IST software. It accommodates the creative interpretive as well as the reductionist processes. The program allows the data to be played with in a truly interactive mode which greatly enhances the generating and testing of theorising possibilities.

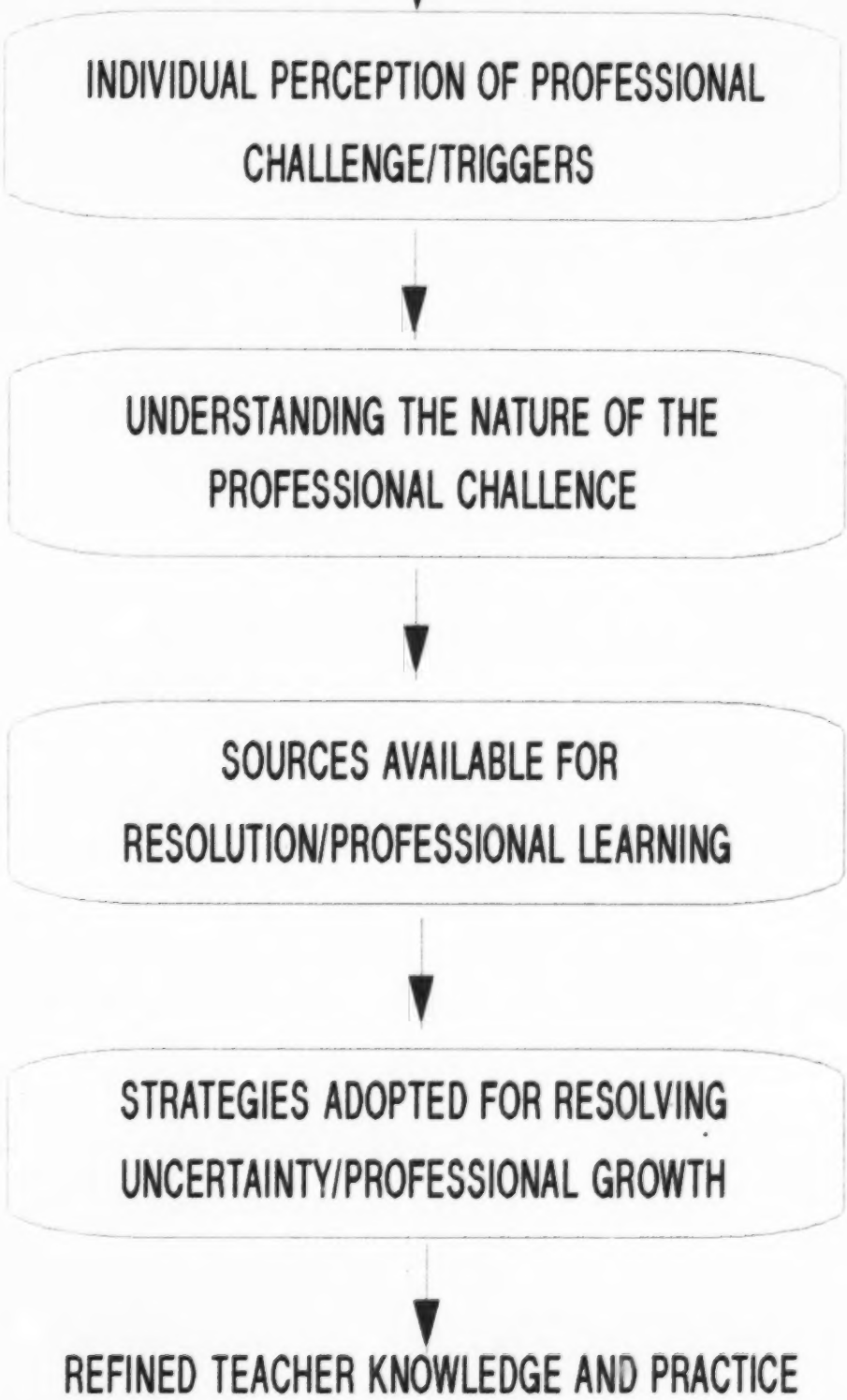
The resultant model, described in the next section, grew out of the themes (and associated 'selective' codes) which emerged from the analytic processes. Hence, it is a 'grounded' model, and does not represent the testing out of an 'a priori' model against the data in this case.

(In sert Figure 1 here)

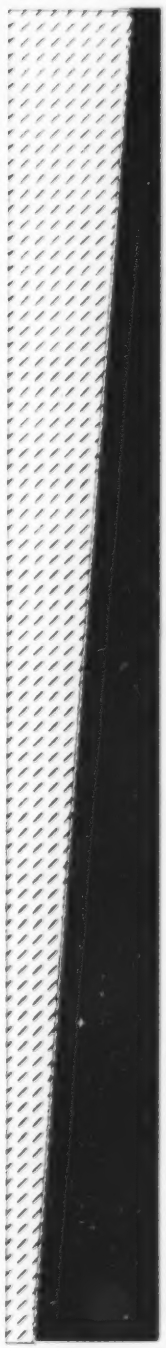
Figure 1

A TRANSFORMATIONAL MODEL OF CONTINUOUS PROFESSIONAL LEARNING

TEACHER'S EXISTING KNOWLEDGE AND PRACTICE


INDIVIDUAL PERCEPTION OF PROFESSIONAL CHALLENGE/TRIGGERS
UNDERSTANDING THE NATURE OF THE PROFESSIONAL CHALLENCE
SOURCES AVAILABLE FOR RESOLUTION/PROFESSIONAL LEARNING
STRATEGIES ADOPTED FOR RESOLVING UNCERTAINTY/PROFESSIONAL GROWTH

REFINED TEACHER KNOWLEDGE AND PRACTICE



5.0 RESULTS of the STUDY

This study was designed to address questions about the long-term processes of developing, maintaining and using professional knowledge and the practice it informs. The NUD.IST software was employed to manage the process of moving from the drawing out of *in vivo* codes from the data towards the development of theoretical explanations of the experienced teachers' conceptions of their professional growth in this case study setting. Figure 1 summarises the outcomes of this data analysis process. It provides a descriptive summary of how experienced teachers encounter professional uncertainty and the processes they engage in, in order to arrive at a comfortable resolution. It is characterised as a transformational model of continuous professional learning in the sense that in an aware professional the "state of feeling comfortable" is always provisional and tentative and may be rendered less certain by the challenge of the changing educational context.

The experiences that the teachers identified as significant in their professional development were seen by them as challenges to their existing knowledge of the teaching and learning process and their role within it.

Interpretation of how the teachers attempted to resolve the uncertainty that challenged their professional understandings has been influenced by the discussions of researchers and theorists in the realm of teacher thinking and from the teachers comments regarding changes to their professional understanding (Neisser, 1976; Lave, 1988; Peshkin and Saloman, 1989; Bereiter, 1985).

This theorising includes perspectives from information-processing theory where an abstract, decontextualised knowledge or skill is thought to be the hallmark of mature understanding to a perceptual model of cognition which highlights the dynamic relation between past experience and the present situation. The relationship so identified provides a framework for accepting both the role of assimilation and the process of accommodation in the development of refined professional understanding.

As Neisser (1976) stresses, our transactions with the world are ***trans*** formative as well as ***in*** formative. "Each of us", Neisser writes, "is created by the cognitive acts in which he engages" (p.11).

The importance of contextualisation over ***de-*** contextualisation has been strongly influenced by the work of Brown, Collins, and Duguid (1989). Their work on **situated cognition** is based on the assumption that learning and cognition, as they put it, is "fundamentally situated" (p. 32). They propose that concepts or ideas do not stand alone as abstract, self-contained entities but that they are intricately joined in the instant (experience) they seek to explain. This suggests that after the particular experience, the concept or understanding is changed (transformed) and acquires a meaning that was not reflected before. The experience has become part of the meaning of the transformed concept.

The four inter-related elements of the model were identified from experienced teachers' accounts of resolving professional uncertainty in relation to the significant experiences about which they talked in the interviews, namely: Individual perception of professional challenges and triggers for change; Gaining an understanding of the nature of the professional challenge; Sources available for resolving the challenge and for extending professional learning; Strategies adopted for resolving uncertainty which in many cases lead to professional growth.

In order for teachers' experiences to have an influence on their professional growth, they must be perceived by the individual as in some way challenging what they currently assume to be "best practice". Only in this way could the experience be truly said to be triggering change. To begin to address the feelings of discomfort accompanying the sense of challenge, the individual has to come to some understanding of the nature and form of the challenge itself. When they have a clear comprehension of what it is that challenges their current practice or understanding and why this has arisen they then have some criteria for reviewing those resources that may be available to them for effectively resolving the challenge within this context. The efficacy of their perception of the nature of the challenge and their awareness of sources of resolution of the situation will govern the extent to which they will be able to develop and use appropriate strategies which can result in their continuing professional growth.

The four elements of the model in Figure 1 are reported on in more detail below including transcript extracts from which they were educed. The figure shows a linear relationship between the four elements of the transformation of experience and learning. The data, as might be expected, showed that individuals also move across and among these elements in non-linear ways dictated by their perception of the particular contextual press.

Individual PERCEPTION of professional challenges, and triggers for change

The teachers perceived that uncertainty in responding to the challenges of their professional knowledge and practices could be triggered by encounters which including being made aware of or being expected to meet the needs of members of the school community. Also resolving issues relating to the teacher's values in respect of the teaching/learning context affected their degree of willingness to accept responsibility for dealing personally and professionally with the challenging experience.

Awareness of children's needs came through getting "to know the kids on a personal level" (RN 148), and encouraging children to take: "responsibility for the things that they do, rather than just having them happen to them", (RN 422-3). Sensing the needs of colleagues: "three of us, became more comfortable with one another and with what was going on, and we started introducing . . " (RF 584-585), and their own needs "so I felt a need for something", (JJ 386), can lead to a more comfortable perception of the call for change. Teachers also emphasised the impact of family and personal values on professional experience as it related to understanding their conceptions of curriculum. One teacher recognised how her early family experience, differed from that of many of her students, " I had a whole family and my family was sort of involved in the Church". But her own experience was nevertheless still influencing "how I perceived children's problems," (JJ 313-315).

Footnote: Capital letters refer to teacher identifier code e.g., 'RN': Numbers refer to lines in the interview transcripts e.g., "423-8".

Their understanding of curriculum, its concept and processes and the traditions of practice as they related to managing the learning process was seen as developing over time, from early career perceptions " I see her (2nd. year teaching partner) this year, and she is teaching with someone else and this year she is starting to think . . . further on to the processes . .", (JJ 708-712) of learning rather than content. With experience came more comfortable perceptions of integration in curriculum, as identified by CB

> " Before, I would take them just as this is language, this is Social Studies and never the twain shall meet. . . . I'm surprised at how easily now I can make the switch. . .. and I think that's probably a very dramatic change for me", (CB 328-340).

Their concept of curriculum and how the learning task was perceived also affected their planning:

> " Your predictions of what you want to do; what equipment you need to have. In your procedure, it is a step by step logical sequence of events (relating to) your set of outcomes", (CB 308-311).

In discussing factors that contributed to their awareness, teachers talked of new ways of understanding what they do. In some cases this came through University study:

> " . . .the opportunity (degree part-time) just to look on things at a philosophical level, questioning why you do things, looking at a broader concept of schools and societies and so on . . .", (RF 323-326).

The way in which a teacher perceives a challenging experience depended on to whom they attributed responsibility for addressing it and what assurances about their actions they felt they could obtain from administrators or colleagues. One teacher pinpointed this: "I was trying to weigh the issues back and forth and, my principal, he really knew I was struggling with that so we sat down and we talked it all over and he just encouraged me to go with what I felt was right", (MM 171-174).

Hence, the recognition of challenge within a current situation was influenced by their perceptual frame including the degree of sensitivity to learners and colleagues and the learning contexts, the intrusion of their own values and their willingness to take responsibility for responding to the challenge.

Gaining an understanding of the NATURE of the professional challenge

In understanding the nature of the challenges presented by experiences in their professional lives, the teachers created meaning through their observations of children's reactions to their learning, focusing on their professional behaviours, interacting with colleagues and with management personnel, and other sources outside the school environment. They also spoke of the continual adjustment to stimuli that were embedded in the comparisons they made regarding their teaching and the students' learning. They also referred to their processes in becoming more aware of their own professional development.

The teachers identified how they became aware of and used the information that was inherent in the learners' responses during classroom activities. For example, (a grouping activity) " was the starting point of us realising, really starting to pick out where the children were at", (JJ 266-270). They particularly focused on the ways that children learned, for example, developing autonomy. "You let them go and you feel quite relaxed about them going. I mean you don't have to be there standing over them, " (MF 244-247).

Awareness of the stages of the children's development and the need to engage their interests also helped in understanding the nature of the professional demands and to evaluate their own responses.

> " . . .the (children's) enjoyment, their interest in the activity. I think if they are enjoying it you are pretty much on the right track. It comes both in the children's sense of achievement and they feel independent, they feel confident, and . . . I like to see them be, risk takers. . . " (TP 421-425).

One teacher described graphically the impact that the children's reactions were having on her professional understandings and the responses that she might need to make:

> "There were blank faces. Well, firstly, there weren't as many children putting their hand up as we expected to answer the question . . . and they all sort of looked at each other and some put their hands up. . . they answered the questions only to find out that really wasn't what I was looking for," (JJ 97-109).

Much professional understanding was gained from the teachers focusing on the nature of their own teaching. They talked of being able to see the learning in the classroom incidents, to question what was achievable and to continually seek to propose and understand new relationships and patterns in the learning context.

TP seemed to see significant gains in understanding the nature of her teaching task and children's learning when she reflected with a colleague in response to an unexpected turn of events. The children had painted directly onto the newspaper instead of waiting for paper. Instead of admonishing them, the teacher had allowed it to continue ...

> " It was really like a spur of the moment, spontaneous and Connie (*teacher's aide*) turned to me and said 'Oh, I can't believe you did that! . . . that became a talking point between her and me, how we react to children and how we really need to think carefully before we step in . . . we really need to stand back a little bit, to just observe and see what's a possible outcome", (TP 315-322).

It was expected from our earlier research (Lange & Burroughs-Lange, 1992) that teachers would identify the influence that colleagues and school administrators had on establishing meanings. They saw that when working closely with fellow teachers, feedback was provided and that their awareness of possibilities was extended by including others in developing personal understanding.

> "And I just felt very open explaining this, telling my colleagues how I use picture books and I was surprised, very much surprised in that they were very interested in it. . . this was a little different and they really liked it", (CB 264-283).

J J made a clear statement regarding having a realistic perspective in her teaching world and the role of others in this:

> "Because different types of people see different angles to situations . . . and sometimes, because you are in your own little world, you are blowing the situation out of all proportion that shouldn't be . . .", (JJ 465-469).

Though teachers referred to formal education courses (pre-service and in-service) as providing exposure to other ideas and ways of teaching and the confidence to change, these influences from outside the immediate classroom and school environments, were not seen as contributing to understanding the nature of professional challenges.

Teachers also adjusted their understanding in response to the variety of stimuli inherent in alternative perspectives and orientations to facets of the teaching/learning process and hence their perception of the nature of its challenges.

The challenge of pressures of time can be differently conceived:

> "I have started to think of education as long-term process rather than as just a short-term thing. If you take a lot of that unnecessary pressure off the kids it's making it a more enjoyable experience for them to learn," (TF 216-220).

They developed their professional understandings and responses by comparing and contrasting their approaches and those of others:

> " And you needed that other sort of person as someone who is, not a model, but who is a contrast for you", (CB 182-183).

> "Because you see this interaction with another teacher who you believe is content directed, you see yourself in moving them (the children) more quickly away into a process-orientation", (JJ 724-726).

CB identified her awakening, her development of assurance that has come from a more comfortable awareness of the nature of professional challenges.

> "I was experimenting with the way she told us to work. I was just surprised. I could really pick up that whereas, go back eighteen months, I couldn't have picked up those ideas so quickly. I would have had done a lot of research and sort of a lot of hesitant action introducing language into the topic. . . .I know what she's talking about. It's easy and I could pick it up very quickly," (197-206).

Teachers endeavouring to understand the nature of the professional challenge with its degree of uncertainty appears to be an integral feature of teachers getting comfortable with their professional selves. RF accounts for this by a need "to step outside the normal way of doing things, just to realise that it is the kids who are really important and not the syllabus or a work program," (RF 146 -147).

SOURCES Available for Resolution of Challenge for Professional Learning

Teachers talked about three areas from which they were able to draw support for their attempts to understand and to choose effective responses to situations which they perceived as challenging to their existing ways of working. These include their own experiences; elements in the school context; and system initiatives at the regional, state and national level.

Using professional experience as a source of understanding to enhance growth involves not just accumulation over time but qualitative change in teacher thinking and actions. TP by recalling "when I first started I was a bit more set (in her ways) " (393 -395) equates greater experience and the accompanying increased confidence with being able to respond more flexibly to teaching/ learning challenges.

Greater experience is also significant when it enables recognition of potential transfer and application of sources learned and used in one curricular setting to support practice in a wider context, e.g., from coaching Aussie Rules football:

> "I found that (when coaching) you accentuate the positive all the time and build a sort of team spirit. You finish with much better results than if you bawl a kid out for doing something," (TF 299-301).

Changes in teacher/student relationships that occur over the passage of time can be accommodated when they enable the teacher to preserve valued aspects of past practices whilst still embracing new and more challenging ways of functioning, e.g.,

> " I still retain some of those traditional standards of control within the classroom . . . I insist on it until I get it . . . I want them to say 'excuse me' to address me by my name . . . but I think I have developed to where children have a fairly easy relationship with me . . . I don't think there is one child in the school who wouldn't be prepared to come up to me and discuss any problem . . ", (BH 71-79).

B H is suggesting that he can become comfortable with his interactions with students by integrating his 'tried' and successful ways of responding to learners into a new openness of interaction.

Formal educational settings at pre-service and in-service levels play a role in building experiences for teachers to draw upon in dealing with professional challenges. These

educational settings can raise the teacher's field of vision beyond the confines of their classroom. MM refers to gaining insight into one of her problems via a 'case study of a late bloomer' (MM 109). Another teacher talks about learning how to 'move with the children' from her " theoretical base and experiences observing good teachers in centres when I was studying, " (TP 387-391). However, a area of possible focus for teacher educators is identified when T P proposed that it may take time before the value of some aspects of pre-service education can come to be realised as worthwhile sources of knowledge to resolve professional uncertainty.

> " Child development, that's what it is. Those years and years of study that we all thought were so boring . . . come to fruition when you are here because you think - Now why is he doing that? " (TP 482-486).

Potential sources of finding resolutions to professional challenges in the school context were identified as the school procedures and practices; the available resources and facilities; documentation and policies; the attitudes and practices of administrators; input of colleagues and other professionals; the children and their parents.

For example, J J speaks of her previous interactions with children as sources for resolving teaching uncertainties. She learned from the specific study of one child, a strategy that helped many more children:

> " . . . if I told him specifically what he had to do, he'd do the right thing. . . so I had to tell him every step of the way . . . to be specific with him helped in dealing with the rest of the class . . . " (J J 333-350).

Administration can provide access to other professionals whilst also demonstrating confidence in the class teacher's judgment. This is not then represented as someone else taking over where the teacher's expertise runs out. M M refers to the support that she received from an administrator who thought that the teacher knew the child best and that consultant psychologists didn't have this level of understanding (110 - 112). This would suggest that it is not merely access to other professionals that seems to support professional development but the way in which the act of seeking support is characterised in the school setting is also important.

Just as off-site educational settings can widen horizons for teacher perception and knowledge, so too can systems' initiatives. TP, as a designated teacher from her school, found that networking and visiting teachers in other settings preserves individuality: " . . . not that it affects the spontaneity and flexibility in the programs, that is a bit more individual . . .". But comments like, " I see their rooms . . . things from networking like we discuss parent problems and how we have tackled them . . . games we have used in our classroom, language, music . . ." (TP 404-412), provide sources for responding more creatively to teaching needs. System-wide initiatives may have overt or covert aims for teacher development. This developmental aspect interacts with issues of owning change and personalising knowledge discussed in the following section and is dependent on whether involvement is voluntary or imposed. One such initiative to which teachers referred, involved both forms:

> " There are 15, I think, compulsory workshops. Then there are another 10 called optional and we are thinking that maybe in our network . . . not every teacher has to do every one of these at the same time", (CB 150-154).

STRATEGIES Adopted for Resolving Uncertainty and Professional Growth

In describing and discussing significant incidents in their professional lives, the experienced teachers included accounts of a wide range of strategies that they employed in resolving problematic circumstances and to which they attributed their professional growth. These identified strategies clustered into two main groups. Those which could be considered either holding approaches which deferred or avoided resolution or active approaches which tackled the difficulty by reference to available sources or strategies and thereby resulted in professional growth.

Holding responses to uncertainty, or felt pressure to change, included strategies such as suspending judgment, shifting responsibility to others, continuing with the familiar way of responding in the hope that a new approach might not then be necessary, adjusting expectations of oneself or by changing what (to them) is considered as acceptable behaviour.

When confronted with an unfamiliar group RS suspended judgment initially :

> " had to adjust to grade One . . . I didn't really know what to expect of them. You don't know whether you are expecting too much or if you are not expecting enough", (31-35).

Sometimes it was possible to shift responsibility for the problem to the learner or other professionals. M M referred to a child who had been "put on a list of being a definite concern" and saw other professionals (psychologists) "testing on the child and getting an academic reading" (94 - 97).

Some teachers continued with the familiar way of responding in the hope that a new approach would no longer be necessary. Sometimes adjusting expectations (usually lowering) of oneself or of the learners, enabled the new situation to be lived with and accommodated to. For example, R F found that by allowing the learners to work in ways that they liked, " while they are active . . they are fine but as soon as you tell them 'sit down, shut up, listen to me' . . . they are woeful", she avoided having to persevere with expectations of behaviour from the children which might be difficult to attain (589-596).

By re-aligning what stands for acceptable effectiveness, the teacher can come to tolerate changes in learner performance or behaviour and, therefore their own roles:

> " Some of our more experienced teachers . . . whether they have given up or not, I don't know, but some have children in their classes that I find a little bit more difficult to control in that when I'm talking, when I'm saying something and giving instruction, I would expect that every child is at least listening to me. . . there isn't this drum of talk . . . now from some teachers I know that I wouldn't have got that 5 or 6 years age, but I'm getting it from them now", (BH 283-292).

These responses so far described might be characterised as 'head in the sand' attitudes or ways of least effort for teachers who are not confident enough, or too weary from long service in the classroom to meet the professional challenge. The reactions might also be seen as sensible first responses where previous experiences of change has made teachers sceptical about its lasting value or the potential to change the long-term prospects for some learners.

Most of the strategies which teachers described as leading to professional growth, greater confidence and increased job satisfaction involved their adopting an active approach to resolving challenging situations.

Active approaches seem to be the more rewarding outcome of processes in the other three categories/elements in our model - namely: perceiving the problem in enlightened ways; using a number of possible routes to understand the nature of the professional challenge; and being aware of and appropriately utilising sources to support a resolution. Professional growth takes place when all these are drawn together to plan and implement an active response to a challenging incident.

When learning and teaching were perceived as not being effective, a common approach was to challenge the curriculum. One teacher saw professional growth as her progress from emphasis on a content-oriented approach to a more process and learner-oriented one. She realised this gradually but most forcefully when she taught with a newly qualified teacher:

> " She had just been six months in . . . so what I really saw in her was the content approach again - so I recognised in myself how content-oriented I had been just to sort of survive. . . in teaching", (J S 690-699).

One teacher described a possible outcome of not challenging the curriculum as resulting in inappropriate referral to special education setting. The student was to be

> " . . . put into a small special education type of setting. The process had started the year before and automatically continued in the year that I had her. There definitely were concerns but I didn't agree that special education was the route to take her. I found that she had made enough gains in the couple of months that she was in my room . . .", (MM 103-108).

The active responses to challenge referred to by teachers, included processes of reflection, research and adaptation which often resulted in a re-evaluation of their teaching philosophy and so led to a personalising of their teacher knowledge. They gave many examples of the processes of reflection which included reaching back for insights from former contexts, experiences and training, the retrieval of potentially appropriate strategies and ideas that had been successfully used in the past and a process of individual or collective review of what had been retrieved, in the light of what they understood about the current problematic context.

T F shared reflection on his own professional learning from an incident of handling a difficult adolescent:

> " . . .Once you get that label as a thief, you are gone. You are going to be blamed for everything . . . and afterwards . . . I have tried to take the same approach with kids and for me it sort of highlighted the pitfalls of labelling kids, not only as a thief, but as dumb, or whatever . . .", (TF 278-282).

And similarly, J T actively collects and reflects on useful strategies:

> " If I am aware of a need in my classroom, or a need in my own teaching, I will keep an eye out for ideas. If a situation comes up I think 'Um, that might be useful' then I'll reach back to that and say "Ok, let's have a look at this idea", (JT 557-563).

Sometimes this reflective process became more deliberate and took on many characteristics of a research approach. The research was described as seeking out reading about the challenging problem or change initiative and getting sufficiently informed to be able to plan an approach.

T F talks about the outcome of researching into his own practice:

> " I think I have tried to make the work more relevant and really tried to make it a bit more interesting. . . I have tried to get away from the 'chalk and talk' type things and more activity learning and probably a little more - not total discovery - but guided discovery learning . . .", (TF 202-207).

The stress of constantly having to generate novel or original responses to educational challenges is addressed by experienced teachers through a focus on adapting what they already do or what they observe others doing or what they find out through research and professional development programs. The adaptation process included choosing strategies close to their current practice or implementing change in small steps. It also often involved a phase of, either literal or mental trial and error and testing of ideas about responding to changes in organisation and considering of how they would work. " (We). . negotiated as to who was going to do what, how we were going to organise the classroom, whether this would work or what would work . . ", (MB 168-175). The significance of this process of helping colleagues adapt and develop in building professional confidence and empowerment was reported by C B: " I showed them how I had been using picture books. Two years ago I wouldn't have thought to dare tell them (other teachers) what they might do . .", (226-228).

Becoming engaged in reflection, research and adaptation in developing strategies to respond to challenging situations can bring about a re-evaluation of teaching philosophy. For example, talking about changing from more teacher-centred approaches towards learner-centred, MF proposed that what the teacher is and does in any context is the outcome of when the professional development experience becomes personalised knowledge.

> " You are in small groups a lot of the time . . . it suited children who learnt that way . . . you sometimes felt you weren't giving enough to the children who didn't learn that way . . . rather you just sit there talking to them with no distractions . . . at the time I questioned it . . .I probably don't question it so much now because I've probably changed a bit too", (MF 109-117).

The four elements that constitute a Transformational Model of Continuous Professional Learning (Figure 1) were developed from the 'selective' codes in the research data of the case study. The foregoing descriptions and text extracts give some indication of the grounding of the model. The model seeks to summarise how the teachers in our study accounted for the processes of refining their professional knowledge and practice. It became clear that changes in their knowledge and practice were motivated affectively and cognitively by the desire to move from a state of professional uncertainty towards feeling more comfortable about what they knew and did. In order to make that transformation they engaged in a four part process. Initially, they had to perceive the situation as challenging to current practice; then to come to some understanding about the nature of the problem, its constituent features and influences. They needed to be aware of and be able to review sources of information and supportive strategies available from within themselves (e.g., past experiences) and within the environment (e.g., colleagues' suggestions) as part of the process of planning a resolution to the challenge. Depending upon the outcome of these three stages, the power of the strategies the teachers ultimately adopt for resolving the challenge will be determined by whether 'comfort' is won through real professional growth or resolution is stalled by some 'holding' device which allows the status quo to continue. Our experienced teachers demonstrated that the balance between professional uncertainty and feeling comfortable is not a smooth transition but can fluctuate to and fro whilst engaged in any of the processes represented in the model. Very often progress towards growth and resolution is characterised by re-iterated loops, re-visiting one or

more of these elements before reaching a satisfactory outcome and their return (albeit temporarily) to 'feelings of comfort' within the professional context.

6.0 LIMITATIONS of the STUDY

There are a number of inhibiting factors which have impinged on the ability of this small-scale case study to generate powerful messages for future policy or practices. In the main, these limitations relate to the size and nature of the sample, the appropriateness of the focus of the data collection and the generalisability of the study's findings and suggested implications.

Although the attempt was made to draw in teachers with a breadth of experiences, the sample could only include those with teaching experiences in rural and urban Queensland. The criteria and interpretations which resulted in awards of Advanced Skills Teacher status to some teachers (which this study adopted as selection criteria) is both politically and ideologically reflective of a particular time and context, with its overt and covert agendas.

The teachers were asked to recall experiences from their past teaching lives and it is acknowledged that memory is highly selective. It is hypothesised however, that if experiences sprung readily to mind, then they had made some impact upon and held significance for the individual and this was in keeping with the aims of the study. Although interviews were conducted on only one occasion with each teacher, the processes of member checking at the interview transcript and model development stages allowed for the participants' and researchers' reflective processes to be extended over time.

The issue of transferability of findings is a complex one. Lincoln and Guba (1990) see this criteria as being beyond facilitating the drawing of inferences from one context to another. They suggest that case studies can provide a vicarious way to learn from the experiences of others: that the research account and its interpretation should also provide a basis for re-examining and re-constructing one's own existing construction of a phenomena.

In this study generalisability has not only been supported by juxtaposition with works identified in the literature section and by grounding in the researchers' previous studies, but also by the Board of Teacher Registrations network of research into teacher knowledge bases.

Under their patronage, this same study design has been undertaken with samples of undergraduate student teachers, post-graduate student teachers, beginning and early experience teachers as well as with 'expert' teachers of this study.

Further research and development is needed to test the wider applicability of the model and to identify the processes that facilitate the transformations identified in our research-based model and to incorporate these processes into teacher education programs.

7.0 CONCLUSIONS

Most learning theorists agree that being able to see connections where previously none were perceived is higher -order learning. Many of the teachers in the study exemplified that finding active ways of getting comfortable in the face of professional uncertainty could result in refined teacher knowledge and practice. This refinement allowed simultaneously for responding with understanding and supporting a knowledge base that could be comfortably tentative.

Our study supports the well developed notion that the key to identifying the knowledge base of teaching lies in the intersection of content and pedagogy - in the capacity to transform the content of teacher professional knowledge into pedagogically authoritative patterns responsive to the variety of teacher learning styles and the contexts in which they evolve and to generate new meanings from their professional experiences, (Shulman, 1986). This transformation process places the emphasis for understanding the teaching and learning environment upon the intellectual bases, the perceptual and cognitive processes of teachers.

The identification of elements and their inter-relatedness as illustrated in the 'transformational model of continuous professional learning' constitute a significant outcome of this present research. If this research has managed to discern a conceptual base of the phenomena being investigated, then a schema has been revealed which can be used to understand how expert teachers in Queensland conceive the reality of their professional development.

A number of implications follow from this model for the structure of teacher education programs at both the in-service and pre-service levels, and for the development of reflective professionals.

Firstly, the research confirms the importance of a sound knowledge base for teachers. If, as demonstrated in this study, teachers consider their challenging encounters with reference to previously developed knowledge, then their refined or transformed knowledge is influenced by that existing schema. This would suggest that the providers of teacher education programs need to give careful attention to the nature of knowledge selected and the ways in which it is experienced by participants. There are suggestions in some contemporary literature that the processes of development are more important features of program design than the knowledge base to be developed. For example, the notions of 'storying and restorying' outlined by Clandinin and Connolly (1991) imply the primacy of process over knowledge. The evidence from this study would emphasise that due consideration should be given to both particular content and particular processes.

Secondly, the elaboration of the elements of the model implies that there is a need for teacher education program developers to identify those experiences and activities which trigger professional challenges and to support the enhancement of the strategies that are used by teachers as they seek sources of professional knowledge and ways of becoming comfortable with their processes for resolving professional uncertainty.

Thirdly, the model implies the importance of individual characteristics and histories in teacher professional learning and development. Program design and structure need to reflect this requirement for individuality. For example, it would be important in this context to realise the significance of existing teacher knowledge and practice, and the ways in which they monitor and direct the cognitive processes for responding to situations that demand some resolution.

Our previous research and those of our network colleagues when viewed alongside this study, leads us to conclude that the fundamental processes of professional learning are preserved in the journey from student teacher to expert practitioner (Lange & Burroughs-Lange, 1992). But expertise does not come from merely accumulating more examples of

applying the same knowledge. As would be expected, expert teachers have more breadth and depth of understanding to challenge ways of making sense of the situation, of recognising the constituent elements. They have greater awareness of the sources and range of resources available to support a successful resolution to a challenging situation, and a wider repertoire of strategies that can be evaluated and employed in productive ways.

But what was made repeatedly clear in this study was that as teachers go through the process of attaining professional knowledge, they develop strategies for getting comfortable with their image of themselves as an effective teacher. This is in itself a changing concept of effectiveness which has to be able to encompass dealing with professional uncertainty as a legitimate function of their role and not as a reflection of their inadequacies. The adequacy of a resolution or the degree of closure that the teacher reaches at any one point in time may be challenged by the next encounter with a professionally demanding situation. What is the solution for the moment may become but one stage in the process of developing robust professional learning. Experienced teachers preserve and build a sense of their own competence (and therefore confidence to act decisively) by developing a concept of professional practice which is both knowledgeable and malleable - that is, firmly rooted in theory and experience whilst remaining infinitely adaptable to a situation which is conceived of as having similarities to and differences from what is known (Handal & Lauvas, 1987).

In summary, we anticipate that our study will contribute to a better understanding of professional learning by expanding the definition and detail of the cognitive and meta-cognitive processes, the environmental influences and the sources that support or impede teachers' professional responses and strategies. We derive comfort for our own professional studies from Peshkin's (1993) assertions regarding the progressive, processual nature of research when he quotes Vidich and Bensman's (1968; 396) " at least, (the researcher) . . can feel he has advanced his problem along an infinite path . . . there is no final accumulation and no final solution" and concludes that " the travels we take down the 'infinite path' can only be facilitated by a type of research that gets to the bottom of things, that dwells on complexity, and brings us very close to the phenomena we seek to illuminate", (Peshkin, 1993; 28).

We are dwelling on complexity, we seem to be getting close to the phenomena and, from the perspectives of our transformational model, we (as teacher educators) are dealing with our own professional uncertainty. Through the educational research agenda, we are engaged in the processes of getting comfortable with our understanding of the complexity of teacher knowledge and learning in ways that are empowering of effective program development.

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